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OBITUARY.

WILLIAM HAGUE HARRINGTON.

In the death of William Hague Harrington, which occurred at Ottawa, on March 13, 1918, the Entomological Society of Ontario lost one of its oldest members. Mr. Harrington was not only a distinguished entomologist but he was also a capable botanist, as well as the possessor of a fund of knowledge on natural history generally.

Born at Sydney, Cape Breton, N.S., on April 19, 1852, he was thus almost 66 years old when he died. His early education was received at a private school. Later he entered the Sydney Academy, distinguishing himself in all lines of study, particularly in mathematics. In 1870, he left Nova Scotia for Ottawa and in November of that year entered the Federal Civil Service, receiving an appointment in the Post Office Department. Here his ability was soon recognized, and from one promotion to another he was, in 1908, appointed Superintendent of the Savings Bank Branch, an important position in the above department. In June, 1916, after 45 years of public service he was granted superannuation, and being thus relieved of official duties, he looked forward to being able to devote himself more fully to entomological studies. Unfortunately, however, this was not to be. More recently, particularly during the past two years, a continued anaemic condition gradually undermined his system. The cold Ottawa winters were felt keenly by him, and during the summers his strength was not sufficient to allow him to undertake any important collecting or other work. Last November his condition became decidedly more serious and he was compelled to take to his bed. About that time too, he had a slight paralytic stroke. During the past winter, paralysis increased gradually and this with profound anaemia finally caused death.

In 1879, Mr. Harrington, with several other naturalists founded the Ottawa Field-Naturalists' Club, and was chosen as a member of the Committee. In 1880 he was elected Secretary-

Treasurer of the Club. In the following year he was re-elected to the same position, and in 1882, the position being divided, he was elected Secretary, which office he continued to hold until March, 1885. In that month he was honoured by being elected President of the Club.

In 1879, Mr. Harrington was also elected to the Council of the Entomological Society of Ontario; in 1891 he was chosen as first Vice-President, and from 1893 to 1895 he acted as President. For a number of years he was also a member of the Editing Committee of the Canadian Entomologist.

In 1894 he was honoured by the Royal Society of Canada, by being elected a Fellow.

The writer first met Mr. Harrington in 1899, and from that time on had the pleasure of meeting him frequently and experiencing the joy of knowing him intimately. This was made possible by that prince of good fellows, the late James Fletcher, who in winter generally arranged for a Saturday afternoon snowshoe tramp or other outing with a "camp" tea at half past six in his unoccupied (during winter) residence on the Central Experimental Farm; a friendly smoke followed, and a brisk walk of a couple of miles to the city in the evening. Harrington and the writer missed few of these pleasures.

Quiet in nature and unassuming, even retiring at times, Harrington was held in high regard by all who knew him. Early in life he became interested in natural history. His chief studies were in the Hymenoptera. He was one of the few English-speaking entomologists who enjoyed a close correspondence with that eminent French-Canadian entomologist l'Abbé Provancher. He also corresponded freely with W. H. Ashmead. During his residence in Ottawa, Harrington amassed an important collection of Coleoptera and Hymenoptera; among the latter are the types of his own species. In addition to being a systematist of recognized standing, he was also keenly interested in economic entomology, being an Active Member of the Association of Economic Entomologists.

At a meeting of the Council of the Entomological Society of Ontario, held in March last, the following letter signed by the

President and Secretary, respectively, was adopted and afterwards forwarded to Mrs. Harrington:

"The members of the Executive Council of the Entomological Society of Ontario desire to express their profound sympathy with you in the loss that you have sustained through the death of your husband, Mr. William Hague Harrington. For more than forty years he was a member of this Society and took an active interest in its welfare and shared in its work. He was regarded not only in Canada, but in the United States as well, as a thoroughly scientific entomologist, whose published contributions were distinguished by their painstaking accuracy and the many original observations contained in them. He was justly considered to be the highest authority upon hymenopterous insects in the Dominion of Canada. We deplore his loss to science and to our Society, and grieve at the removal of a colleague and friend."

The Ottawa Field-Naturalists' Club on March 15 resolved as follows:

"The Council of the Ottawa Field-Naturalists' Club has learned with deep regret of the death on Wednesday, March 13, of Mr. William Hague Harrington, F.R.S.C. Mr. Harrington was known and highly respected by entomologists, botanists and other scientific men, not only in Canada but throughout the United States as well. His studies, particularly on certain families of insects, had given him a wide reputation, and in his death the science of entomology particularly has lost a devoted worker. As a former Secretary and Past President of the Club he was held in high regard by our members."

The following is a list of Harrington's more important writings:

IN THE CANADIAN ENTOMOLOGIST:

Entomology for Beginners—Some Wood Eaters; 1880, 95, 258;

Field Notes; 1881, 7;

Entomology for Beginners—Long-stings; 1882, 81;

Notes on the occurrence of some species of Uroceridæ; 1882,
224;

Variations in markings of *Cicindela sexguttata*; 1883, 239;

- Additions to Canadian lists of Coleoptera; 1884, 44, 70, 96,
117;
- Larva of Dolba hylaeus; 1884, 54;
- Entomology for Beginners—Notes on a June Ramble; 1884,
101.
- Notes on Tenthredinidæ, 1885; 1886, 38;
- Note on *Oryssus sayi*; 1886, 30;
- Tenthredo (?) delta* Prov.; 1886, 32;
- Notes on *Xiphydria albicornis*; 1886, 45;
- Oryssus sayi* Westwood; 1887, 81;
- Hints on Collecting Hymenoptera; 1887, 115;
- The Nuptials of Thalessa; 1887, 206;
- Further Observations on *Oryssus sayi*; 1887, 239;
- New Species of Canadian Tenthredinidæ; 1889, 95;
- Ibalia maculipennis* Hald.; 1889, 141;
- Tenthredinidæ Collected at Ottawa, 1899; 1890, 23;
- Two Interesting Monstrosities; 1890, 124;
- On the lists of Coleoptera published by the Geological Survey
of Canada, 1842 to 1888; 1890, 135, 153, 184;
- Notes on a few Canadian Rhyncophora; 1891, 21, 114;
- Two species of Canadian Pimplinæ; 1891, 132;
- Note on *Amblyopone pallipes* Hald.; 1891, 138;
- Platynus* New to Canada; 1891, 115;
- Additional Note on *Amblyopone pallipes* Hald.; 1892, 76;
- Canadian Hymenoptera; 1892, 98;
- Two Distinguished Settlers; 1892, 112;
- Obituary; Abbé Provancher; 1892, 130;
- A New *Ischalia* from Vancouver Island; 1892, 132;
- Canadian Hymenoptera; 1893, 29, 57;
- An Entomological Trip to Copper Cliff, Ont.; 1894, 9;
- A Teratological Trio; 1894, 86;
- Canadian Hymenoptera; 1894, 193, 209, 245;
- Staphylinus cæsareus* Cederh. and *S. erythropterus* Linn. in
Canada; 1894, 356;
- Notes on Hymenoptera; 1895, 155;
- Occupants of the Galls of *Eurosta solidaginis* Fitch; 1895, 197;
- Canadian Hymenoptera, No. 7; 1896, 75;
- A Canadian *Triogonalys*; 1896, 108;

- Catalogue of the Phytophagous and Parasitic Hymenoptera of
Vancouver Island; 1897, 16, 43;
Six New Ottawa Proctotrypidæ; 1899, 77;
A Few Canadian Longicorns; 1899, 107;
Notes on Bæus; 1901, 331;
Note on *Pityophthorus coniperda*; 1902, 72;
A Canadian *Anoplonyx*; 1902, 93;
Arctic Siricoidea and Tenthredinoidea; 1903, 15;
Male Wasp with Female Antennæ; 1903, 37;
- IN THE REPORTS OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO:
- Rhyncophora—Weevils; 1880, 80;
Some Fungi Eaters; 1881, 22;
Long-stings; 1882, 23;
House-flies; 1882, 38;
Chrysomelidæ—Leaf-eaters; 1882, 53;
Insects Collected in 1882; 1883, 35;
A New Foe to the Maple; 1883, 40;
Injurious Insects Affecting the Hickory; 1883, 42;
Notes on a June Ramble; 1884, 30;
Saw-flies (Tenthredinidæ); 1884, 63;
Hymenoptera Aculeata—Ants, Wasps, and Bees; 1885, 48;
Insects Infesting Maple Trees; 1886, 22;
The Nuptials of Thalessa; 1887, 25;
Hints on Collecting Hymenoptera; 1887, 43;
Hymenoptera Parasitica; 1890, 64;
Notes on Japanese Insects; 1891, 90;
Obituary Notice of the Abbé Provancher; 1892, 88;
Annual Address of President; 1893, 17;
Canadian Uroceridæ; 1893, 49;
Additional Notes on Japanese Insects; 1893, 50;
Notes on a Few Canadian Coleoptera; 1894, 47;
Annual Address of the President; 1894, 9.
Some Winter Insects from Swamp Moss; 1895, 47;
Some Beetles Occurring Upon Beech; 1896, 69;
Notes on the Insects of the Year 1897; 1897, 30;
Notes on Insects of the Year in Ottawa District, 1898, 87;
Notes of Insects of the Year in Ottawa District, 1899, 94;
Notes on Insects Injurious to Pines; 1902, 114;

Hymenoptera; 1902, 99;

Diptera; 1902, 101;

IN THE TRANSACTIONS OF THE OTTAWA FIELD-NATURALISTS' CLUB:

On Some Insects Captured During our Excursions; 1880, 41;

On Some Coleoptera Injurious to our Pines; 1881, 28;

List of Ottawa Coleoptera, with Introduction to Order—In
this article 1,003 species are listed; 1884, 67;

Our Saw-flies and Horn-tails; 1884, 244;

IN THE OTTAWA NATURALIST:

Note on Flour and Grain Beetles; 1887, 133;

Fauna Ottawaensis—Hemiptera—About 200 species listed;
1892, 25;

Entomology—Edited by W. H. Harrington; 1892, 84, 103,
113, 150, 168;

List of Coleoptera from Cypress Hills, N.W.T., 1892, 149;

Fauna Ottawaensis—Hymenoptera Phytophaga; 1893, 117;

Hymenoptera Phytophaga, 1893; 1893, 162;

Fauna Ottawaensis—Hemiptera—additional list; 1894, 66;

Unusual Abundance of Meloid Larvæ; 1895, 90;

Ottawa Spiders; 1896, 11;

Ottawa Spiders and Mites; 1897, 190;

Fauna Ottawaensis; Hymenoptera Parasitica—Proctotrypidæ;
1897, 174, 217;

Ottawa Coleoptera—Cerambycidæ; 1899, 57;

Extra-limital Insects Found at Ottawa; 1899, 117;

Fauna Ottawaensis—Diptera—234 species listed; 1900, 127;

Fauna Ottawaensis—Hymenoptera: Superfamily II—Sphe-
goidea; 1902, 215;

Fauna Ottawaensis—Hymenoptera: Superfamily III—Ves-
poidea; 1908, 69;

Reminiscenses of Dr. Fletcher; 1909, 196;

IN THE TRANSACTIONS OF THE ROYAL SOCIETY OF CANADA:

Canadian Uroceridæ; 1893, 131;

Catalogue of Canadian Proctotrypidæ, 1899, 169;

IN THE NATURALISTE CANADIEN:

Souvenirs Entomologiques, XXVI, 65, 106.

In addition to the above, short notes, reviews, etc., were
published, as well as important articles on subjects other than

entomological. His last article, "Notes on Some Ottawa District Plants" (11 pp.) was published in the February, 1917, issue of The Ottawa Naturalist. He was certainly an excellent student and most careful writer. His writings have indeed enriched our knowledge of Canadian Entomology.

His wife, one son and one daughter survive him. To them we extend our deepest sympathy in their sad bereavement.

ARTHUR GIBSON.

POPULAR AND PRACTICAL ENTOMOLOGY.

EXPERIMENTS WITH CUTWORM BAITS.*

BY JOHN J. DAVIS AND C. F. TURNER, LAFAYETTE, INDIANA.

In the Emergency Entomological Service of the United States Department of Agriculture, No. 5, Sept. 1, 1917, we reported experiments to determine the suitableness of sawdust as a filler for cutworm and grasshopper poison baits in place of the increasingly expensive wheat bran. Briefly these results were as follows: Tests were made at Johnson, Indiana, in a corn field infested with so-called "over-flow worms" (*Agrotis ypsilon*). Here the regulation bran mash, that is 1 lb. poison to 25 lbs. filler (sawdust or bran), 2 quarts molasses, six lemons and water as needed. Three formulæ were used. Paris green and bran, Paris green and sawdust, and white arsenic and bran, and these were scattered broadcast at the rate of 5 lbs. per acre. The ground thus treated July 9 was re-planted to corn July 14, and counts were made July 23, with the following results:

Paris green and bran.....	2% plants cut.
Paris green and sawdust.....	5% plants cut.
White arsenic and bran.....	3% plants cut.
Check.....	50% plants cut.

Similarly at Akron, Indiana, experiments were conducted with Paris green and bran and Paris green and sawdust for the control of the army worm (*Cirphis unipuncta*). Two strengths

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were used in each case, viz., 1 pound to 25 of filler and 1 pound to 50 of filler, the bait being scattered broadcast at the rate of 10 lbs. per acre. The applications were made late one evening, and counts made the following morning with the following results:

Paris green and bran, 1-25.....	76.3% worms dead.
Paris green and bran, 1-50.....	65.7% worms dead.
Paris green and sawdust, 1-25.....	55.5% worms dead.
Paris green and sawdust, 1-50.....	57.1% worms dead.

Examinations made two days after the application showed approximately 75% value in the sawdust bait area and practically all were dead in the bran bait area, and approximately the same results were obtained by using these baits in the furrow plowed around the field.

The continuation of these experiments has been possible through the courtesy of Prof. C. G. Woodbury, Director of Purdue Agricultural Experiment Station, who placed at our disposal space in the station greenhouse and during the months of January and February, 1918, 95 individual experiments were conducted with a view to determining the relative value of sawdust in comparison with bran, different kinds of arsenicals, and varying formulae. The insect used in these tests was the common army worm (*Cirphis unipuncta*) and the method adopted was somewhat as follows: enamel trays 4 x 8 and 3" deep were used, these being banded on the inside with tree tanglefoot to prevent escape of worms. Twelve army worms were used in each cage, and a small amount of poison material together with a similar amount of a comparable bait unpoisoned and wheat foliage was placed in the cage, giving the worms every possible opportunity to utilize the unpoisoned bait or foliage if they so desired. The results may be summarized as follows: Of the 18 individual experiments representing 216 larvæ, where the comparative value of bran and sawdust was tested, we found 52.5% of the worms killed where sawdust was used as a filler and 86.1% where bran was used. In the same number of experiments testing a half and half bran and sawdust mixture in comparison with bran alone we found 72.5% killed where the combination was used, and 90.7% where bran alone was the filler.

Table 1. Value of substitutes for bran in poison bait.

Bran Versus Sawdust.				Bran Versus Sawdust and Bran.			
Number Expts.	Number larvae represented	Per cent. Killed with		Number Expts.	Number larvae represented	Per cent. Killed with	
		Sawdust bait	Bran bait			Sawdust & bran bait	Bran bait
18	216	52.7+	86.1+	18	216	72.5	90.7+

It is thus evident that bran is noticeably superior to sawdust alone and even the combination of sawdust and bran, but these laboratory experiments in connection with the field experiments at Johnson and Akron, Indiana, show that sawdust does have some value and can be recommended where it is impossible or very difficult to obtain bran but where it is used, a second application will probably be necessary and a combination with some bran which will prevent the mixture from scattering into too fine particles and drying quickly, is preferable.

Three kinds of sawdust were used: viz., old hardwood (oak and hickory), new hardwood (hickory) and pine. The pine sawdust seemed to have a decided repellent effect and should not be used as a filler for the poison bait. In comparing new and old hardwood sawdust we found a larger percentage killed where the new was used, but our comparative tests with these materials are not sufficient to draw satisfactory conclusions. The new hardwood (hickory) was used in all experiments in comparison with bran.

The most important data obtained was a comparison between Paris green and other arsenicals. In the total number of experiments where Paris green was used, 16 in number, we killed 75.8% while calcium arsenate in 5 experiments killed 70%; sodium-arsenite in 4 experiments killed 80.8%; lead arsenate in 3 experiments, 85.8; arsenous acid (white arsenic) in 2 experiments gave 20.8%, and crude arsenous acid, a by-product of copper refineries which contained 88% of arsenous oxid, killed in 14 experiments 74.4%. It might be stated that these materials were used 1 lb. to 40 of filler, excepting in one experiment with crude arsenous oxid and one experiment with arsenous acid where it was used 1-25, and in all three experiments with lead arsenate where it

was used at the rate of 1-20. The checks in these experiments gave a death rate of 11.6%.

Table 2. Effectiveness of poisons.

Arranged in order of value according to combined effectiveness and rapidity of killing.

Filler used	Sodium arsenite 1-40	Paris green 1-40	Crude arsenous 1-40	Calcium arsenate 1-40	Lead arsenate 1-20	Arsenous acid	Check
Bran.....	100	90	80.2+	80.1+	79.1+	33.3+ (1-25)	14.5+
Bran and sawdust.....	75	75	72.2+	41.6+	100	—	12.5
Sawdust.....	50	52.7+	41.6+	50	—	8.3+ (1-40)	12.5
Total average.....	80.8+	75.8+	74.4+	70	85.8+	20.8+	11.6+

Analyzing further these results and especially comparing the value of Paris green with crude arsenous oxid we find that in three experiments where sawdust was used, the Paris green killed 52.7%; in three experiments with sawdust and bran it killed 75%, and in ten experiments where bran alone was used 90%, while the experiments with crude arsenous oxid killed, in two experiments where sawdust was used, 41.6%; in three experiments where sawdust and bran was used, 72.2%, and in eight experiments where bran was used 80.2%. Where crude arsenous oxid was used, 1-40, which was the same strength as Paris green, we have a killing power very slightly in favour of Paris green, and it might be stated in this connection that crude arsenous oxid was used even as weak as 1-60 pounds of filler with very satisfactory results, and when used at the rate of 1-25 it was remarkably effective.

In interpreting these results we must consider not only the ultimate effectiveness of the individual poisons but also the rapidity with which they kill. In analyzing the results from this point of view, we find that Paris green, crude arsenous oxid and sodium arsenite killed with approximately the same degree of rapidity, sodium arsenite being a little more prompt in its action than either of the other two. During the first two days of the experiment, calcium arsenate was slower in action but in most cases

caught up with the other poisons within two and one-half days. Arsenate of lead was much slower than any of the four poisons mentioned above, although ultimately, that is at the end of five or six days, was more effective than the other poisons, although it must be remembered that the arsenate of lead bait was used twice as strong as the other poisons. Arsenous acid (white arsenic) gave the poorest results, for it was not only much slower in action but its accumulative effect was inappreciable.

Summarizing our results with poisons we can conclude that Paris green, crude arsenous oxid and sodium arsenite are the more desirable for poison baits, while calcium arsenate is next in value. Our results indicate that lead arsenate should only be used when one of the four poisons mentioned above are not available, and then it must be used at a strength of about 1-20. Our results with arsenous acid are wholly negative.

Table 3. Results from use of varying mixtures.

Combina-tions tested	Bran, lem. ext. and molasses	Bran, lem. fruit and molasses	Bran and lem. ext.	Bran and lemon fruit	Bran and banana	Bran and molasses	Check
Number experiments....	8	9	3	3	2	3	5
No. larvæ represented.....	98	108	36	36	24	36	60
Per cent. killed.....	72.7+	66.6+	72.2+	63.9+	83.3+ without molasses 66.6+ with molasses	72.2+	18.3+

Various experiments were made to determine the effectiveness of bait prepared in different ways. That is, bait where lemon extract was used in place of lemon fruit; and with and without molasses. There was no great difference between baits prepared with bran, lemon extract and molasses; bran, lemon fruit and molasses; bran and lemon extract; bran and lemon fruit; bran and molasses and bran and bananas. However, in all of the experiments where lemon extract was used in comparison with lemon fruit, the extract gave a higher percentage of effectiveness, and these experiments, although carried on in the laboratory, seem to be sufficiently conclusive to warrant the use of lemon extract in

place of fruit if more convenient. There seems to be no noticeable difference in baits where molasses was used and where it was left out, and conversely approximately equal effectiveness was obtained where the fruit or extract was left out of the bait. We had only two experiments using banana in place of the citrus fruits, and the results were very satisfactory and warrant further trials in the field.

Tests of different formulae to determine the attractiveness of different baits can hardly be considered satisfactory or reliable when conducted in a small pan such as we used, but it is believed that they indicate certain possibilities which should be tested in the field to determine their practical application. This summary is given for the benefit of others who may be planning work along this line the coming season.

"The crude arsenous oxid referred to above contains 85 to 92 per cent. arsenous oxid (As_2O_3), the sample used in our experiment containing 88 per cent., according to the analysis furnished by the U. S. Insecticide Board. It is obtainable from the Anaconda Copper Mining Company, Anaconda, Montana, through the sales agents, The United Metals Selling Co., 42 Broadway, N.Y., at $7\frac{1}{2}$ cents per pound, but only in barrel lots of 400 to 500 pounds."

NOCTUID NOTES.

BY WM. BARNES, M.D. AND J. McDUNNOUGH, PH. D., DECATUR, ILL.

We have read with great interest Mr. Wolley Dod's able criticism of the arrangement of species in our recent Check List (1918, Can. Ent., L, pp. 8-16 and 43-51). We have long regarded Mr. Dod as one of the most careful students of Noctuidæ in America and believe that, in most instances, the shifting of species advocated by him will be found to be correct. In the preparation of our Check List we found it impossible thoroughly to revise each Noctuid genus, as the work involved would have necessitated the postponement of the list for at least several more years; we, therefore, with certain minor limitations, followed the order of species as given in Hampson's Catalogue of the Lepidoptera Phalaenæ of the British Museum, although fairly certain that an intensive study of the structural details of this group, and especially of the

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male genitalia, would lead to considerable alteration in the sequence of species within the genera (especially such bulky ones as *Polia*, *Hadena*, *Acronycta*, etc.) The only two genera on which we expended more than the usual amount of time and attention were *Euxoa* Hbn. and *Catocala* Schr.; our arrangement of species in this latter genus is vastly different from that given by Hampson and is based upon work done for the American Museum of New York in connection with a forthcoming Memoir on the Catocala moths; in the genus *Euxoa* we had studied rather exhaustively the male genitalia and based the specific synonymy on a comparative study of the genitalia of specimens which we had matched with type specimens in the various museums; very possibly some alteration in the sequence of species may be necessary, but (rightly or wrongly as the case may be) we believe that the synonymy is largely correct.

A few notes on some of the species which Mr. Dod discusses may be of value as giving our standpoint in the matter; we shall only touch on those species concerning which we are inclined to differ from Mr. Dod or about which we are still doubtful.

Arctia oblitterata Stretch is not definitely known to us; we based our reference to *ornata* on the strength of the red secondaries and the figure given in Jour. N. Y. Ent. Soc., XIV, Pl. VI, Fig. 14, which looks rather like a specimen of *edwardsi* Stretch with reduced banding on primaries. We had never heard of any tendency in *turbans* to show red secondaries but if, as would appear from Mr. Dod's note, he possesses a specimen with secondaries of this colour his association would probably be more correct than our own.

Euxoa relaxa Sm. Our reference of this species to *septentrionalis* Wlk. is based on a study of the genitalia of the type male from San Francisco in the National Museum. The genitalia of *septentrionalis* are very characteristic and strikingly different from those of *messoria* with which it superficially agrees very closely; the salient features of the genital structure could be seen on the type of *relaxa* without removing the abdomen, and seemed to us to be identical with that of *septentrionalis*.

Euxoa campestris Grt. We are not surprised that Mr. Dod questions the correctness of separating this species from *declarata*

Wlk. (*decolor* Morr.). A study of the genitalia of a number of Eastern specimens convinced us that there were two very closely allied species associated under the one name and occurring apparently throughout the same general territory; the one form has the primaries very dark purple-brown with scarcely any contrasting shades and with small reniform and orbicular; the other form has a more reddish cast to the purple-brown of primaries, the reniform and orbicular are often distinctly larger and the secondaries of the ♂ appear to be paler. The two forms are extremely alike, and we must confess that individual specimens have caused us considerable trouble to place. The differences in the ♂ genitalia are slight but constant, the first form having a shorter inner branch to the harpe, the outer branch being not so evenly rounded at its base and much longer, whilst in the second form the two branches form a very regular U, and the inner is only slightly shorter than the outer. We found considerable difficulty in determining whether names were valid for each of these species. *Declarata* Wlk., the oldest name available, we knew was based on a Vancouver Island male; we had seen the type once but this was before we had realized the existence of two species; from the specimens before us from this region we believed it would apply to the second form and used it in this sense in our list. *Campestris* Grt., another available name, was first described in the October number of the Can. Ent., 1875, VII, 188; a few months later (December) a redescription appeared in the Proc. Acad. Nat. Sci. Phil., p. 423. The specimens from which the description was drawn were from Orillia, Canada, (Norman); N. Y. (Mead); Vancouver Is. (Hy. Edwards), and in the December number of the Can. Ent. for the same year Grote figured the Orillia specimen, a female, (Pl. 1, Fig. 6) designating it (p. 227) as the type. We believe that this action on Grote's part must be taken as definitely fixing the type specimen and that, therefore, the specimen in the British Museum, a ♀ from New York, which bears the type label can at the most be considered a Paratype. Very possibly the Orillia specimen is also in the British Museum as Hampson's catalogue mentions a female from Canada (Norman); if so it should be marked as type; it will be interesting to discover whether the two specimens, the real type and the pseudo-

type, represent the same species or whether Grote's type series was mixed. Judging by his figured type we were led to apply the name *campestris* to the first form mentioned by us, but this will need verification by an actual examination of the specimens, which possibly Mr. Dod can carry out.

Decolor Morr. presents a still more difficult and unsatisfactory problem, since the type specimens cannot be found and are probably destroyed; we placed the species tentatively as a synonym of *declarata* but should not be surprised if it really were found to be a dark form of *tessellata*; the original description (1874, Proc. Bost. Soc. N. Hist., XVII, 162) is poor but mentions a dark, terminal area and dark space between the spots, also a whitish hind-wing with dark border; in Can. Ent. VII, 214, Morrison elaborates on his previous description but his series then probably contained both forms, and his remark about a yellow spot being present at the base of the tegulae certainly savors of *tessellata*, although the fact that a slight, whitish scaling is often visible in *declarata* makes it impossible to definitely refer *decolor* to *tessellata* on these grounds.

Euxoa orbicularis Sm. The specimens figured by us (Contr. I, (4), Pl. XVII) as this species does not belong here at all but should be referred to *remota* Sm., a species doubtfully distinct from *tessellata*. The true *orbicularis*, the type of which we have seen in the Tepper collection, is an entirely different species which we have not yet satisfactorily identified in our material, but which seems best placed somewhere near *mærens* Grt.

Euxoa remota Sm. We cannot agree with Mr. Dod in referring *tristicula* to this species; it is true that the ♀'s in the Hy. Edwards' collection represent *nesilens* but the ♂ specimen in the National Museum, labeled "type" and to which the name must be held is a form (superficially like *nesilens* we admit) closely allied to some of the *tesselloides* forms and well matched by the specimen we figured as *orbicularis* (Pl. XVII, Fig. 16).

Graptolitha winnipeg Sm. If a specimen before us compared with type and marked "exact" be correct, we cannot agree with Mr. Dod's reference of this species to *laticinerea*. The colour of the primaries in *winnipeg* is a distinctly dark blue-gray without the greenish tinge found in *laticinerea*; a reference of *winnipeg* to *unimoda* would have surprised us less.

LECTOTYPES OF THE SPECIES OF HYMENOPTERA
(EXCEPT APOIDEA) DESCRIBED BY ABBÉ
PROVANCHER.

BY A. B. GAHAN AND S. A. ROHWER, WASHINGTON, D.C.

(Continued from page 171.)

Semiotellus suborbicularis. Type.—Yellow label 972.
2nd Coll. Pub. Mus., Quebec. Fair.

Sigalphus canadensis. Type.—Female, 2nd Coll. Pub. Mus., Quebec, pinned opposite male with name label and yellow label 594. Both lack head, type has wings crumpled.

Sigalphus trisectus. Type.—Male, blue label 115; yellow label 1302. 2nd Coll. Pub. Mus., Quebec.

Spalangia aenea. Type.—Harrington Coll.

Spathius laflammei. Type.—Female, yellow label 563.
2nd Coll. Pub. Mus., Quebec. Dirty, apices of antennæ gone.

Sphacophilus crawii. Type.—Cat. No. 1979, U. S. Nat. Mus.

Sphaerophthalma alveolata. Type.—Yellow label 1685.
2nd Coll. Pub. Mus., Quebec. Tagged "Cap Rouge."

Sphaerophthalma argentipilis. Type.—Male, white label 17 (in pencil); yellow label 1406. 2nd Coll. Pub. Mus., Quebec.

Sphaerophthalma unicincta. Type.—Yellow label 751.
2nd Coll. Pub. Mus., Quebec.

Sphaeropyx ovalis. Type.—Female, yellow label 1272. 2nd Coll. Pub. Mus., Quebec. Fair. Badly tagged.

Sphaeropyx parvus. Type.—Female, yellow label 1027.
2nd Coll. Pub. Mus., Quebec. Apices of antennæ gone.

Sphaeropyx quebecensis. Type.—Female, yellow label 601.
2nd Coll. Pub. Mus., Quebec. Right antenna and apex of left, gone.

Steniola duplicata. Type.—Male, yellow label 1614. 2nd Coll. Pub. Mus., Quebec. Apex of left antenna gone.

Stilpnus appendiculatus. Type.—Not located.

Stilpnus canadensis. Type.—Male, yellow label 234. 1st Coll. Pub. Mus., Quebec. Antennæ broken at apex; abdomen, right fore-wing and all legs except one front one broken off; abdomen and part of legs glued on yellow label.

Stilpnus deficiens. Type.—Harrington Coll. Antennæ missing and wings dirty.

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Stilpnus laevis. Type.—Yellow label 702. 2nd Coll. Pub. Mus., Quebec. Antennæ (right at 7th joint, left at scape), legs on right side at coxae, left hind leg, right fore-wing and abdomen gone.

Strongylogaster abnormis. Type.—Female, yellow label 1147. 2nd Coll. Pub. Mus., Quebec. Allotype.—Male without label.

Strongylogaster albosectus. Type.—Female, yellow label 96. 1st Coll. Pub. Mus., Quebec. Lacks right flagellum. Two specimens without labels.

Strongylogaster impressatus. Type.—Not located.

Strongylogaster luctuosus. Type.—Female, Harrington Coll.

Strongylogaster pallicoxus. Type.—Female, yellow label 1149. 2nd Coll. Pub. Mus., Quebec. Allotype—Male, Harrington Coll. Paratype.—Female, also Harrington Coll.

Strongylogaster politus. Species must be accredited to Cresson. Type.—Female, Philadelphia No. 274. Male, yellow label 498; 1st Coll. Pub. Mus., Quebec, not a type.

Strongylogaster proximus. Type.—Female, Harrington Coll. Paratype.—Yellow label 1159. 2nd Coll. Pub. Mus., Quebec.

Strongylogaster soriculatus. Type.—Female, yellow label 692; name label "Strongylogaster soriculatipes Prov." in Prov. hand. 2nd Coll. Pub. Mus., Quebec.

Synairema americana. Type.—Female, yellow label 1081. 2nd Coll. Pub. Mus., Quebec. Lacks right flagellum.

Synairema pacifica. Type.—Female, Harrington Coll. Antennæ and right fore-wing gone.

Synaldis pilicornis. Type.—Female, yellow label 1165. 2nd Coll. Pub. Mus., Quebec. Ovipositor broken off.

Syntomaspis splendens. Type.—Harrington Coll. Abdomen missing.

Tapinoma boreale. Type.—Yellow label 1403. 2nd Coll. Pub. Mus., Quebec. Eight specimens on one tag. Badly glued.

Taxonus floridanus. Type.—Cat. No. 13965, U. S. Nat. Mus. Paratype.—Yellow label 1540. 2nd Coll. Pub. Mus., Quebec.

Taxonus parens. Type.—Female, Harrington Coll. Antennæ wanting.

Taxonus robustus Type—Yellow label 931. 2nd Coll. Pub. Mus., Quebec. Flagellum gone.

Telenomus rufoniger. Type.—Yellow label 1364. 2nd Coll. Pub. Mus., Quebec. Fair.

Telenomus stygicus. Type.—White label 20; yellow label 1120. 2nd Coll. Pub. Mus., Quebec Abdomen gone.

Tenthredo atrocoerulea. Type.—Not located. Probably returned to collector. (Geddes).

Tenthredo basilaris. Type—Female, yellow label 58 and name label *Tenthredo signata* Nort. 2nd Coll. Pub. Mus., Quebec. Proved by Prov. Catalogue.

Tenthredo cingulata. Type.—Female, yellow label 59, and name label *Tenthredo verticalis* Say. 2nd Coll. Pub. Mus., Quebec. Proved by Prov. Catalogue.

Tenthredo decorata. Type.—Not located.

Tenthredo erythromea. Type.—Harrington Coll. Female. Paratype.—Yellow label 1154. 2nd Coll. Pub. Mus., Quebec.

Tenthredo jocosa. Type.—Female, yellow label 494. 2nd Coll. Pub. Mus., Quebec.

Tenthredo lineata. Type.—Female, yellow label 63. 2nd Coll. Pub. Mus., Quebec. Lacks part of flagellum.

Tenthredo mellicoxa. Type.—Female, yellow label 109; white label "109 mellicoxa." 1st Coll. Pub. Mus., Quebec.

Tenthredo montana. Type.—Not located. Probably returned to collector. (Capt. Geddes).

Tenthredo nigricostata. Type.—Female, Harrington Coll. Lacks antennæ.

Tenthredo pallicoxa. Type.—Female, yellow label 69. 2nd Coll. Pub. Mus., Quebec. Rather dirty.

Tenthredo ruficoxa Type.—Female, Harrington Coll. Right median tarsi gone, slightly dirty.

Tenthredo terminalis. Type.—Male, Harrington Coll. Left flagellum gone.

Tetrastichus trisulcatus. Type.—Harrington Coll. Fair. Allotype.—Yellow label 1377. 2nd Coll. Pub. Mus., Quebec. Badly glued.

Thalessa quebecensis. Type.—Not located.

Theocolax canadensis. Type.—Yellow label 1030. 2nd Coll. Pub. Mus., Quebec. Badly glued.

Thersilochus errabundus. Type.—Harrington Coll.

Thersilochus maturus. Type.—Female, yellow label 1227, blue label 106 (s). 2nd Coll. Pub. Mus., Quebec.

Thersilochus micans. Type.—Female, yellow label 372. 1st Coll. Pub. Mus., Quebec. Allotype.—Male, yellow label 1040. 2nd Coll. Pub. Mus., Quebec. Right antenna at scape missing, abdomen broken off at petiole but glued on yellow label.

Thersilochus pallipes. Type.—Female, yellow label 676. 2nd Coll. Pub. Mus., Quebec. Antennæ broken at tips.

Thyreocera leviscutum. Type.—Yellow label 1322. 2nd Coll. Pub. Mus., Quebec. Badly glued.

Thyreopus elongatus. Type.—Not located.

Thyreopus rugosopunctatus. Type.—Female, blue-green label 851(s); yellow label 1445. 2nd Coll. Pub. Mus., Quebec.

Thyreopus sinuatus. Type.—Not located. Probably returned to collector.

Tiphia minor. Type.—Not located.

Trichacius clavatus. Type.—Blue label 764; yellow label 1376. 2nd Coll. Pub. Mus., Quebec. Fair.

Trichacis auripes. Type.—Not located.

Trichiosoma taylori. Type.—Female. Lacks left antenna. Allotype—male. Ent. Branch, Dept. Agr., Ottawa. Male paratype.—Yellow label 1151. 2nd Coll. Pub. Mus., Quebec.

Trogus canadensis. Type.—Female, yellow label 241. 1st Coll. Pub. Mus., Quebec. Allotype.—Male, yellow label 194. 2nd Coll. Pub. Mus., Quebec.

Trogus quebecensis. Type.—Female, yellow label 240. 1st Coll. Pub. Mus., Quebec. Right antenna gone.

Tropistes elegans. Type.—Not in Pub. Mus., Quebec, unless under *Arotes amoenus* Cress.

Tryphon canaliculatus. Type.—Female, yellow label 325. 2nd Coll. Pub. Mus., Quebec. Fair.

Tryphon clapini. Type.—Female, yellow label 421. 1st Coll. Pub. Mus., Quebec.

- Tryphon clypeatus.** Type.—Male, yellow label 333. 2nd Coll. Pub. Mus., Quebec.
- Tryphon dionnei.** Type.—Female, yellow label 657. 2nd Coll. Pub. Mus., Quebec. Lacks left flagellum.
- Tryphon dorsalis.** Type.—Female, yellow label 363. 2nd Coll. Pub. Mus., Quebec.
- Tryphon dufresnei.** Type.—Female, not located. Allotype.—Male, yellow label 329. 2nd Coll. Pub. Mus., Quebec.
- Tryphon excavatus.** Type.—Female, yellow label 1560. 2nd Coll. Pub. Mus., Quebec. Lacks apex of right antenna.
- Tryphon fractus.** Type.—Male, blue label 560. 2nd Coll. Pub. Mus., Quebec.
- Tryphon hervieuxii.** Type.—Female, yellow label 656. 2nd Coll. Pub. Mus., Quebec. Head gone.
- Tryphon pediculatus.** Type.—Male, yellow label 1236. 2nd Coll. Pub. Mus., Quebec.
- Tryphon rufigaster.** Type.—Female, yellow label 1562. 2nd Coll. Pub. Mus., Quebec.
- Tryphon rufopectus.** Type.—Male, yellow label 1563. 2nd Coll. Pub. Mus., Quebec. Poor condition, apices of flagellum gone.
- Tryphon scutellaris.** Type.—Not in Pub. Mus., Quebec, unless as var. of *dufresnei* Prov.
- Tryphon tuberculifer.** Type.—Female, yellow label 1237; labeled "Tryphon tuberculiferus Prov." 2nd Coll. Pub. Mus., Quebec.
- Trypoxylon striatum.** Type.—Not located. Probably returned to collector.
- Urocerus tricolor.** Type.—Female, yellow label 72. 2nd Coll. Pub. Mus., Quebec.
- Westwoodia fumipennis.** Type.—Female, yellow label 388. 1st Coll. Pub. Mus., Quebec.
- Xiphidion canadensis.** Type.—Female, yellow label 138. 1st Coll. Pub. Mus., Quebec.
- Xiphydria canadensis.** Type.—Female, yellow label 137. 1st Coll. Pub. Mus., Quebec. Apices of left wings wanting.
- Xorides canadensis.** Type.—Not in Pub. Mus., Quebec, unless under *Xylonomus albopictus* Cress.

Xylonomus calidus. Type.—Female, blue label 596, in large figures. 2nd Coll. Pub. Mus., Quebec.

Xylonomus lavallensis. Type.—Not in Pub. Mus., Quebec, unless under *Xylonomus humeralis* Say.

Zele basalis. Type.—Female, white label 81; yellow label 1483. 2nd Coll. Pub. Mus., Quebec. Badly tagged.

Zele cinctus. Type.—Male, yellow label 729. 2nd Coll. Pub. Mus., Quebec. Abdomen, left legs, left fore-wing and part of antennae gone.

Zele curtus. Type.—Female, blue label 277(s); yellow label 1276. 2nd Coll. Pub. Mus., Quebec. Wings somewhat matted.

Zele gracilis. Type.—Male, yellow label 1277. 2nd Coll. Pub. Mus., Quebec. Badly tag-mounted.

Zele palliventris. Type.—Female, yellow label 573. 2nd Coll. Pub. Mus., Quebec. Lacks left flagellum and all legs except left front leg; abdomen glued on card.

Zele rufipes. Type.—Female, yellow label 731. 2nd Coll. Pub. Mus., Quebec.

THE EARLY STAGES OF EMPOASCA TRIFASCIATA GILL.¹

BY HARRY B. WEISS AND EDGAR L. DICKERSON,*
NEW BRUNSWICK, N. J.

While not recorded in Smith's List of the Insects of New Jersey, this attractive little leaf-hopper appears to be fairly well distributed in New Jersey, having been found by the writers on poplar at Irvington, Red Bank, Ridgefield, Trenton and New Brunswick. De Long in his "Leafhoppers or Jassoidea of Tennessee" (Bull. 17, Vol. V, No. 2, Tenn. State Bd. Ent.) records it as being swept from cottonwood at Clarksville, Tenn., and Van Duzee in his check list of the "Hemiptera of America, North of Mexico," gives its distribution roughly as "Eastern States to the Mississippi Valley and Eastern Canada." It was described by Gillette in the Proc. U. S. Nat. Mus., vol. XX, p. 726 (1898) from specimens taken at Douglas Co., Kansas, Champaign, Ill.,

¹Identified by E. P. Van Duzee.

*The arrangement of the authors' names has no significance, and indicates neither seniority nor precedence.

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and Ames, Iowa, having been found on cottonwood at the latter locality.

In New Jersey it has been found on both Carolina poplar (*Populus deltoides*) and Lombardy Poplar (*Populus nigra italicica*) principally on the former. Over-wintering takes place in the egg stage, the eggs being found in young twigs and hatching occurs

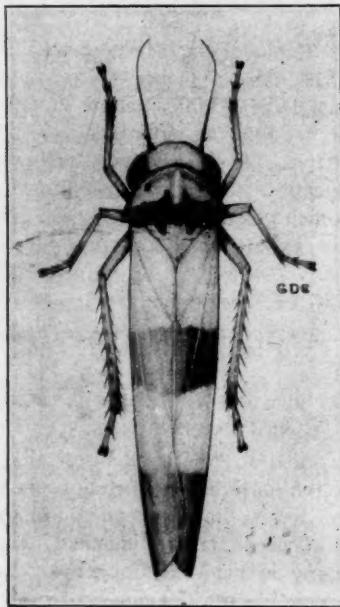


Fig. 8.—*Emboasca trifasciata* Gill.

during the last of May or first part of June. From three to four weeks are required for the nymphal stages, and by the last of June or first of July, adults of the first brood are present. Summer eggs are then deposited in the tissue of young twigs, and these hatch during the last week of July. By the last of August, adults of a second brood are present. Winter eggs are deposited during

September, and the adults linger on the trees until the cool weather of early October.

Both the nymphs and adults are very active. After hatching, the nymphs make their way to the leaves and can be found on both surfaces, principally the lower. They appear to scatter considerably after the early stages. In one instance only, early in the season, a colony of nymphs was found, but during the remainder of the season, all stages of the nymphs were found singly on the leaves and scattered over the trees. When many nymphs are present, their feeding produces a characteristic, whitish discolouration of the upper leaf surface.

The adults are extremely active and scatter soon after emergence. On rainy days they exhibit a tendency to collect to a certain extent on the foliage, and at these times many can be obtained without difficulty.

Egg.—Length 0.92 mm., width 0.15 mm. Translucent, cylindrical, elongate, sides parallel; basal end rounded; neck bent slightly to one side; slightly curved when viewed laterally. The eggs appear to be laid singly in the last made growth of the twig. The position of each egg is indicated by a blister-like elevation of the bark about one-sixteenth of an inch in diameter. These blisters may be either circular or oval. Each egg is firmly embedded in the tissue under the bark with its long axis parallel to the twig and with its cap facing the bark. Upon removing the blister-like elevation of the bark, only a slight discolouration of the green tissue indicates the presence of an egg. On account of their translucence, they blend with the tissue and are easily overlooked unless a careful search is made. The blisters are found anywhere on the young twigs, sometimes in groups of two or three, but more often widely removed from each other.

First stage nymph.—Length 1.25 mm., width of head including eyes 0.26 mm. Shape elongate, broadest at head and fore part of abdomen, tapering posteriorly. Dorsal surface reddish brown. Fine median white line on front of head and dorsal surface of head and thorax. First and second abdominal segments white. Dorsal surface of head, each thoracic and abdominal segment bearing transverse rows of hairs; several hairs on head and a transverse row on posterior margin of each thoracic and abdo-

minal segment. Eyes prominent. Antennæ reddish brown, about one-half the length of the body. Legs reddish brown except coxa, trochanter, basal portion of femur, apical end of tibia and base of tarsus which are light. Femur and tibia bearing hairs. Rostrum extending to second pair of legs.

Second stage nymph.—Length 1.72 mm., width of head including eyes 0.46 mm. Similar to first stage but slightly darker. Median line indicated on dorsal surface.

Third stage nymph.—Length 2.1 mm., width of head including eyes 0.5 mm. Similar to preceding stage but slightly darker. Dorsal surface of thorax depressed. Sides of mesothorax extending half way through metathorax. Metathorax extending slightly at sides. Antennæ two-fifths the length of the body.

Fourth stage nymph.—Length 2.8 mm., width of head including eyes 0.7 mm. Similar to third stage but darker. Light median dorsal line indicated on abdomen in some specimens. Wing-pads of equal length, decidedly more pronounced, narrow, extending to the third abdominal segment.

Fifth stage nymph.—Length 3.5 mm., width of head including eyes 0.75 mm. Dorsal surface dark, reddish brown. Fine median line on front and dorsal surface of head and thorax. A light patch on each side of line on head. Median posterior portion of mesothorax white. Surface of metathorax white, tinged with brown. Wing-pads of equal length, long, narrow, reaching fourth abdominal segment. Fine, median, dorsal line indicated on abdomen. Eyes prominent. Antennæ reddish brown, basal joints darker, one-third length of body. Legs, light reddish brown, lighter at base of femur and tip of tibia. Coxa and trochanter white. Rostrum white, reaching to between second pair of legs.

Adult.—*Empoasca trifasciata* Gillette. The description of this species by Gillette in "American Leaf-hoppers of the Subfamily Typhlocybinæ" (Proc. U. S. Nat. Mus., vol. XX, p. 726) follows: "Pale green, with three transverse, smoky bands above. Length 4 mm. Face golden yellow above, shading into green on the clypeus, with a broad, whitish, median stripe; face fully as long as broad. Front with sides nearly parallel, two-thirds longer than broad between the eyes, very obtusely rounded above. Clypeus about one-third longer than broad, a little less than one-

half the length of the front, broad at the base, constricted at the upper one-third, rather blunt at the apex. Genae appearing as a mere line past the lora but nearly attaining the tip of the clypeus; genae, lora and clypeus pale green. Vertex slightly longer at the middle than at the eyes, very obtusely rounded in front, colour golden yellow, paler on posterior margin, having a slender, dark median line, ocelli pits large and pale in colour, but no ocelli; eyes very black and large, shortest distance between the eyes 1.7 times the length of the vertex at the middle. Pronotum twice the length of the vertex and nearly twice as wide as long; anterior two-thirds golden yellow, the remainder black. Scutellum bright green at tip but somewhat smoky on posterior portion. Elytra pale green, a deep smoky transverse band at the middle of the clavus, not quite attaining the costal margin, the apical area deep smoky on inner half, second apical cell with a short peduncle. Tergum washed with golden yellow, venter pale green, tips of pygofers and ovipositor deep green. Legs pale green with tips of tibiæ and tarsi deep blue green."

AN ANNOTATED LIST OF THE CERAMBYCIDÆ OF CALIFORNIA.

BY RICHARD T. GARNETT, UNIVERSITY OF CALIFORNIA, BERKELEY, CAL
(Continued from page 177.)

53. *Aneflus volitans* LeConte.
Found at San José del Cabo, Lower California.
54. *Aneflus prolixus* LeConte.
Found at Cape San Lucas, Lower California.
55. *Aneflus protensus* LeConte.
Found at Cape San Lucas, Lower California.
56. *Aneflus linearis* LeConte.
Found at Cape San Lucas, Lower California.
57. *Eustroma validum* LeConte.
Found in Southeastern California and at San José del Cabo, Lower California.
58. *Compsa puncticollis* LeConte.
Found at San José del Cabo, Lower California.
59. *Compsa quadriplagiata* LeConte.
Found at Cape San Lucas, Lower California.

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- 60. *Poecilobrium chalybaeum* LeConte.
Found in the middle part of California, common on flowers of Ceanothus at Pasadena; also on poison oak flowers in Sonoma Co. June 3-July 7.
 - 61. *Poecilobrium rugosipenne* Linnell.
One specimen taken from California.
 - 62. *Eumichthus oedipus* LeConte.
Found in Humboldt and Sonoma Counties on flowers of Spiraea.
 - 63. *Phyton discoideum* LeConte.
Found at Cape San Lucas, Lower California.
 - 64. *Hybodera tuberculata* LeConte.
A number of specimens have been taken by Ricksecker at Camp Meeker, Sonoma County. Breeds on maple in Washington.
 - 65. *Hybodera debilis* LeConte.
Found in Los Angeles County by Fall. Has been beaten from live oak in the Bay Counties by Van Dyke.
 - 66. *Callimus cyanipennis* LeConte.
Found occasionally in Northern California and Sierras. Taken frequently in Southern California, at Los Angeles on Ceanothus by Fall. Found on Ceanothus, Spiraea, and other flowers by Van Dyke.
 - 67. *Callimus ruficollis* LeConte.
Found commonly in Northern California on Ceanothus and poison oak flowers by Van Dyke. I found this so numerous in June in Lake County as to be present in almost every sweeping of poison oak; so numerous that most were allowed to escape. June 7-July 9.
 - 68. *Megobrium edwardsii* LeConte.
This has been found on live oak at Pomona by Fall, on oak at San Diego by Blaisdell, taken from Ceanothus twigs at Monterey by Slevin, and also found at Santa Rosa Island.
 - 69. *Callimoxys sanguinicollis* Olivier (*C. fuscipennis* Lec.—male).
Found rarely in Southern California, common in Northern California on flowers of Ceanothus and poison oak. June 1-July 3.

70. *Molorchus longicollis* LeConte.
Found rarely in Southern California, common in Northern California on Ceanothus and various other flowers. June 13.
71. *Rhopalophora bicincta* Horn.
Found in Lower California.
72. *Rhopalophora rugicollis* LeConte.
Found in Lower California.
73. *Holopleura helena* LeConte. (*H. marginata* Lec.—female).
Found in Northern California and Sierras, rare in Southern California. Bred by the author from laurel at Oakland, Alameda Co. June 28—July 3.
74. *Rosalia funebris* Motschulsky.
This is common in the redwood belts of Marin and Sonoma Counties. Breeds in laurel (*Umbellularia californica*). In State of Washington it breeds in ash. Taken at Oakland, June 21.
75. *Dendrobias mandibularis* Serv. (*quadrimaculatus* Dup.)
Has been found commonly by Fall on the wing in early evening, about the willows along the Colorado River at Yuma in July. Found in Lower California. July 5.
76. *Lissonothus multifasciatus* Dup.
Found in Arizona; supposed also to be in vicinity of Yuma. Found in Lower California.
77. *Stenaspis solitaria* Serv.
Common at Cape San Lucas, Lower California.
78. *Tragidion annulatum* LeConte.
Found by Fall at Pomona, Pasadena, Lower California; by Van Dyke at Banning on mesquite; by Cottle at Upper Soda Springs, Shasta Co.; also by Van Dyke on South Fork of the King's River Canyon, Fresno.
79. *Tragidion armatum* LeConte.
Found by Van Dyke at Newhall, Los Angeles Co., sucking the sap of *Yucca whipplei*.
80. *Purpuricenus dimidiatus* LeConte.
Taken by Blaisdell at San Diego, by Van Dyke in Shasta Co., by Huguuron at Alma, Santa Cruz Co.

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- Found on Yerba Santa, locally called "Mountain Balm." July 12.
81. *Metaleptus angulatus* Chevrolat.
Found in desert region of Southern California.
82. *Amannus pectoralis* LeConte.
Location given as Yuma by LeConte.
83. *Batyle suturalis* Say.
Taken in numbers by author in latter part of May at Calistoga, Napa County. On Ceanothus flowers. May 28-June 27.
84. *Oxoplus marginatus* LeConte.
This and the following may be sexes. Found at San José del Cabo, Lower California.
85. *Oxoplus cruentus* LeConte.
Found at San José del Cabo, Lower California.
86. *Oxoplus jocosus* Horn.
Rare in the foothills near Pomona; found by Fall flying in day-time along the streams.
87. *Crossidius ater* LeConte.
Found in Nevada. Probably is also found in adjacent parts of California.
88. *Crossidius testaceus* LeConte.
Found at San Diego by Ricksecker, flying in September. Breeds on the roots of *Bigelovia arborescens*.
89. *Crossidius intermedius* Ulke.
Found in Los Angeles County on small, yellow-flowered plants.
90. *Crossidius discoideus* Say.
Taken by Coquillett in Mountains of Los Angeles County.
91. *Perarthrus vittatus* LeConte.
Found by Ricksecker at San Diego in September on the flowers of *Bigelovia arborescens*.
92. *Sphaenothecus suturalis* LeConte.
No data on this species.
93. *Sphaenothecus basalis* Horn.
Found at San José del Cabo, Lower California.

94. *Stenosphenus novatus* Olivier.

Found at San José del Cabo, Lower California. Several specimens were beaten from willow in July at Yuma by Fall.

95. *Cyllene antennatus* White.

Common in the deserts of Southern California, breeding in mesquite. Has been picked up on the streets of Los Angeles. Also bred by Van Dyke from mesquite brought to Los Angeles as fire wood.

96. *Cyllene crinicornis* Chevrolat.

Found in the deserts of Southern California. Have a specimen sent to me from Hololulu, T. H.

97. *Clytus lanifer* LeConte.

Found throughout the State, especially north of San Francisco and in the Sierras. Taken by Van Dyke on the flowers of *Eriogonum fasciculatum*. Abundant on the flowers of the chestnut oak in Sonoma Co. Also taken in the San Bernardino Mts. by Van Dyke. Taken by myself at Newcastle in July.

98. *Clytus planifrons* LeConte. [*Xylotrechus*, in Henshaw—6189].

Found rarely north of San Francisco and in the Sierras. Bred by Rivers from dead branches of willow at San Francisco.

99. *Xylotrechus undulatus* Say.

Found in northern part of the State and in the Sierras. Breeds in *Pseudotsuga taxifolia* and probably other coniferous trees. Taken at St. Helena, Napa Co., by the author from cordwood of *Pinus ponderosa*. June 1—July 30.

100. *Xylotrechus insignis* Lec.—female. (*X. oblitteratus* Lec.—male).

Breeds in various species of willow; found in all parts of State. There are two forms, one of them a southern form with much yellow pubescence.

101. *Xylotrechus annosus* Say.

Rare in northern part of State. Taken by author at Donner Lake in July. Taken by Van Dyke in Trinity County breeding in poplar.

102. *Xylotrechus nauticus* Mannerheim.—
Found commonly throughout the State. Taken by Blaisdell and Van Dyke breeding in live oak; taken by Blaisdell and Pierson breeding in *Eucalyptus globulus* at San Diego and Berkeley, respectively. Also taken in Sonoma County by Ricksecker. June 2-Aug. 14.
103. *Neoclytus irroratus* LeConte.
Rare, but several have been found in Southern California. Taken at Pasadena by Dagget, at Santa Barbara by Fall, at Los Angeles, Mt. Shasta, and the south fork of the King's River Canyon by Van Dyke.
104. *Neoclytus conjunctus* LeConte.
Found in Northern California. Taken by Van Dyke breeding in manzanita and madrone; found by Kusche breeding in *Quercus douglasii* and *Fraxinus oregona*.
105. *Neoclytus muricatulus* Kirby.
Feeds on *Pseudotsuga taxifolia* in the northern part of the State.
106. *Neoclytus balteatus* LeConte.
Rare, 2 taken in Shasta County, one by Cottle, one by Van Dyke; taken on manzanita. One taken by Van Dyke near the King's River, Fresno County, and one by Slevin near Monterey.
107. *Neoclytus interruptus* LeConte.
Found in Northern California. July 26.
108. *Neoclytus modestus* Fall.
Taken by Fall and Hopping at Pasadena and Kaweah, respectively.
109. *Neoclytus carus* Fall.
Found in the mountains near Pasadena by Fall, and at Santa Monica by Van Dyke.
110. *Neoclytus tenuiscriptus* Fall.
Taken by Fall at Pasadena and Claremont.
111. *Euderces parallelus* LeConte.
Found at San José del Cabo, Lower California.
112. *Callichroma cobaltinum* LeConte.
Found at Cape San Lucas, Lower California.

113. *Atimia confusa* Say.

This has been cited from California by Henshaw, but this is doubtful. (Teste Van Dyke).

114. *Atimia dorsalis* Le Conte.

Found mainly in the north and in the middle Sierras. Is found rarely at Riverside. Taken by Van Dyke breeding in post cedar.

115. *Desmocerus auripennis* Chevrolat.

Found from Mt. Shasta to Mt. Whitney in the high Sierras, breeding in mountain elderberry. Taken at Truckee in July by myself. July 7.

116. *Desmocerus cribripennis* Horn.

Found mainly in Coast Belt not more than several miles from the sea, as far south as Mt. Tamalpais. Breeds in red-berried elderberry trees. (Van Dyke).

117. *Desmocerus californicus* Horn.

Rare, found from Los Angeles north through the coast range to Marin County. Breeds in black-berried elderberry trees. (Van Dyke).

118. *Necydalis laevicollis* LeConte.

Found in Northern California. Bred from tan bark oak by H. C. Muzzall.

119. *Necydalis cavipennis* LeConte.

Found in Santa Cruz County, also on Russian River. Taken by Van Dyke in the North, and by Ricksecker in San Diego and Sonoma Counties.

120. *Necydalis barbaræ* Rivers.

Found rarely at Santa Barbara.

121. *Ulochates leoninus* LeConte.

Found in Northern California and Sierras, also San Bernardino Mts. Bred from *P. ponderosa* by Van Dyke at Sissons and King's River.

122. *Pyrotrichus rutilicollis* LeConte.

Found by Fuchs and Van Dyke breeding in the heart-wood of alders about San Francisco Bay. May 29.

123. *Leptalia macilenta* Mannerheim.

Breeds in willow, found along the coast belt from

northern boundary to Santa Cruz. Taken at Oakland, November 2.

124. *Rhagium lineatum* Olivier.

Breeds in various pines. Found by Blaisdell breeding in yellow pine; by author on Jeffrey pine at Summit, Nevada County; by Slevin on Monterey pine at Monterey. Found north and throughout the Sierras. June 18-July 29.

125. *Centrodera nevadica* LeConte.

Taken by Fuchs near Lake Tahoe; by Blaisdell at San Diego; by Pilate in Tulare County; by Van Dyke in Trinity County, breeding in *Pinus ponderosa*.

126. *Toxotus vestitus* Hald.

Common in Northern California and throughout the Sierras. Found on flowers of wild hollyhock, azalea, lupine, etc. There are several colour varieties. Taken at Oakland, June 2.

var. *nubifer* LeConte.

var. *lateralis* Casey.

Taken at San Francisco.

127. *Toxotus flavolineatus* LeConte.

This is the western phase of *T. vittiger* Rand (= *T. trivittatus* Say). Found in the deep woods of the coast belt just north of San Francisco.

128. *Pachyta monticola* Rand.

Rare in the Sierras and north, probably feeds on spruce.

129. *Pachyta liturata* Kirby.

Found at high altitudes in the Sierras. Taken by Daggett on Mt. Whitney at elevation of 8,000-9,000 feet. Taken by Van Dyke at Mt. Shasta at elevation of 8,000 feet, breeding in fir.

130. *Pachyta spurca* LeConte.

Several specimens taken by Fall at Echo Mt., Southern California. Found by Van Dyke at Santa Monica. Breeds in *Pseudotsuga taxifolia*. It flies at night and is attracted to light. Is more common in the Sierras and north of San Francisco. July 13.

131. *Anthophilax tenebrosus* LeConte.
Rare in the Sierras, several specimens having been taken in Placer and Eldorado Counties. July 13.
132. *Acmaeops pinguis* LeConte.
This is probably a variety of *A. tumida* LeConte.
133. *Acmaeops tumida* LeConte.
Rare in Southern California; common in Central and Northern California on flowers, especially *Ranunculus californicus*, wild sunflower, wild hollyhock, etc. Taken by author at Oakland and Calistoga. June 1-November 7.
134. *Acmaeops viola* LeConte.
Found in the extreme northern part of the State on flowers. Also taken at Calistoga by author. May 28.
135. *Acmaeops vincta* LeConte.
Described from Montana, also taken in Oregon. Probably found in the extreme north of California.
136. *Acmaeops basalis* LeConte.
Common in the middle of California and occasionally in the north on wild rose and certain umbelliferous plants. June 20.
137. *Acmaeops militaris* LeConte.
Fairly common in parts of the extreme north of the State and in the Sierras. Taken in Sonoma County by Ricksecker. June 11-July 21.
138. *Acmaeops falsa* LeConte.
Found by Daggert at Mt. Whitney, between the leaves of *Yucca whipplei*. Taken by Van Dyke in June on flowers, especially those of wild holly. Found also at Calmalli Mines, Lower California.
139. *Acmaeops proteus* Kirby
Taken by author at Calistoga, June 1. Reported from Lower California.
140. *Acmaeops pratensis* Laich.
Rare in Northern California and occasionally in the higher Sierras as far south as Mt. Whitney. More common in the North and in the Rockies.

(To be continued)

ON THE VALIDITY OF *EUPithecia harlequinaria* DYAR.

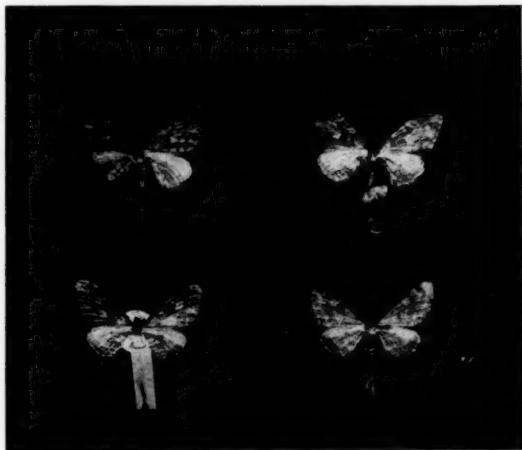
BY E. H. BLACKMORE, VICTORIA, B.C.

In the Check List of B. C. Lepidoptera, published by the Provincial Department of Agriculture in 1916, the late Rev. G. W. Taylor listed *Eupithecia harlequinaria* Dyar as a synonym of *bifasciata* Dyar. Later, in the Can. Ent., Vol. XVII, No. 3, p. 80, he says of *harlequinaria* that "one of the Victoria specimens passed through my hands and I have no hesitation in saying that it was merely a very brightly coloured, fresh specimen of *bifasciata*."

As I have been making a special study of the B. C. Geometrids for the past four years, I was naturally interested in the above remark. In 1914 I took a worn specimen of *Eupithecia* which was referable to *harlequinaria* as compared by me with one of the types which is in the Provincial Museum, Victoria, B.C.

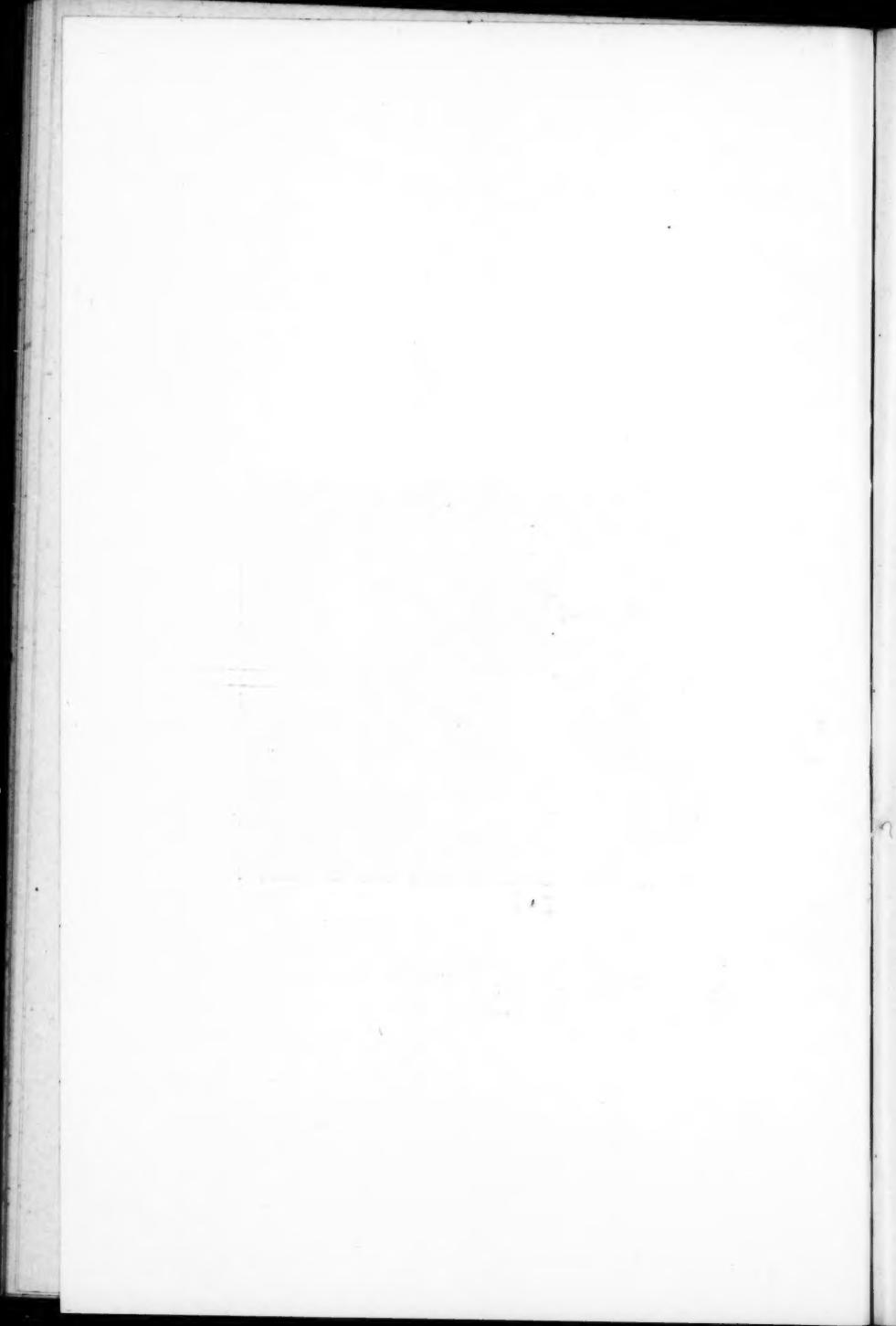
In 1915 I took another specimen, which was in perfect condition and matches the type exactly. Through the kindness of Mr. J. W. Cockle, of Kaslo, who sent me three specimens of *bifasciata* I have been able to make a careful comparison of them, and I have no hesitation in saying that they are two distinct, and easily recognizable species, and that they are not liable to be confused one with the other. One of Mr. Cockle's specimens bears a label in his handwriting: "One of the original set from which Dyar's determination was made" and I presume that Mr. Cockle means that it is one of the short series that he had, from which Dr. Dyar selected the one which he made the type. However, it exactly fits Dr. Dyar's description of *bifasciata* (Proc. U. S. Nat. Mus., Vol. XXVII, p. 891). Dr. Dyar's description of *harlequinaria* (Proc. Ent. Soc., Wash., vol. 7, p. 29, 1905) is particularly good, and the specimen I took in 1915 fits the description in every particular.

Anyone reading the two descriptions together could not, by any stretch of the imagination, believe them to refer to the same species, and it is inconceivable to me that Dr. Dyar would describe the same insect twice in such a short space of time. The most striking difference between the two species is the presence, in *harlequinaria* of a large, bright, ochreous patch on the upper side of the primaries, running from the discal spot to fringe, and occupying the space between veins 3 and 4, overspreading each a



EXPLANATION OF PLATE III.

- Fig. 1.—*Eupithecia harlequinaria* Dyar. Type specimen in Provincial Museum, Victoria, B.C. Taken by E. M. Anderson, May 20, 1903.
- Fig. 2.—*Eupithecia harlequinaria* Dyar. Agrees with type, but is a perfect specimen. Taken at Victoria, B.C., by E. H. Blackmore, May 2, 1915.
- Fig. 3.—*Eupithecia bifasciata* Dyar. One of the short series from which Dyar selected his type. Taken at Kaslo, B.C., by J. W. Cockle, June 7, 1903.
- Fig. 4.—*Eupithecia bifasciata* Dyar. Agrees with Fig. 3. Taken at Kaslo, B.C., by J. W. Cockle, June 17, 1907.



little. It is an irregular oval patch, measuring approximately 5 mm. in breadth by 2 mm. in depth. This at once distinguishes it from any other *Eupithecia* known to me.

The broad, whitish band at the outer third, which is a distinguishing feature of *bifasciata* is not present in *harlequinaria*. Apart from the difference in maculation, they also differ in time of emergence. My two specimens of *harlequinaria* were taken May 2nd, 1915, and May 22nd, 1914, (worn), respectively, and the type in the Provincial Museum bears a label in Dr. Dyar's handwriting: "20th May, 1903." The three specimens of *bifasciata* from Mr. Cockle bear dates June 7th, 1903; June 17th, 1907; and July 3rd, 1910, and Dr. Dyar's types were June 13th and 25th, so that it is quite evident that there is a full month's difference in the time of their appearance.

Further I have no record of *bifasciata* being found west of the Cascade Range, and all the specimens of *harlequinaria* that I know of, have been taken on the immediate coast. As regards the latter species it must be exceedingly rare, as I can find no record of any specimens being taken at Victoria between those taken by Mr. E. M. Anderson in 1903, and the two that I captured in 1914 and 1915. I have seen all the chief collections in Vancouver and on Vancouver Island, but none of them contain any specimens of *harlequinaria*.

In conclusion I think that I have adduced enough evidence to prove conclusively that *harlequinaria* and *bifasciata* are two distinct species.

AUTHOR'S NOTE.—This article was written eighteen months ago, but was accidentally mislaid and only recently found. I wrote to Messrs. Barnes and McDunnough, pointing out these differences about a year ago, and they have listed them as distinct species in their new Check List.

BOOK NOTICE.

FIELD BOOK OF INSECTS—By Frank E. Lutz, Ph. D., Associate Curator, Dept. of Invertebrate Zoology, American Museum of Natural History. Pp. 509. About 800 illustrations, many in colour. G. P. Putnam's Sons, New York and London, 1918. \$2.50.

This is a companion to the Field Book of Wild Birds and their Music, Field Book of American Wild Flowers and Field Book of American Trees and Shrubs, and its aim is to give the kind of

information about insects usually sought by the laity, with whom the author, in connection with his museum work, has long been in close contact. Its usefulness, however, does not stop here, for it will prove invaluable to every young entomologist and serviceable even to those of experience. It contains a great deal of information within a small compass, and although necessarily much condensed it is written in simple language as free as possible from technical terms.

The first 38 pages contain brief sections of an introductory nature on the system, growth and structure of insects, longer discussions on collecting and mounting, and on the control of injurious forms, and on insect-like Arthropods, particularly spiders. The rest of the book treats of the various orders and families, with brief accounts of the commoner or more striking species found in the Northeastern United States. Particular attention is given to such forms as are commonly observed by the layman, such as the larger, more conspicuous or more injurious species, but some notice is taken of nearly all the families. Thus we find that a relatively large space is given, and quite properly so, to the butterflies and larger moths and to some of the beetles. The long-horned beetles, however, receive somewhat more than their share of space, there being a key to the species extending over nearly twenty pages. There are a number of other keys to families and genera and in some cases species, and among the latter is a useful one to the commoner kinds of Muscid flies, which is followed by brief descriptions of the characters and habits of the more important species and of the methods of combatting these dangerous insects. There is also a special section at the end of the book on galls, which is illustrated by a large number of figures.

The illustrations form a most attractive feature of the book. Almost 700 of the entire number are the work of Mrs. E. L. Beutenmuller, who deserves great credit for the faithful manner in which she has performed an enormous task. Some of the coloured plates have suffered in the reproduction but most of them are satisfactory and the black-and-white figures are almost uniformly excellent. Nearly 600 species are illustrated by one or more figures.

We heartily recommend this admirable work to every young entomologist and outdoor naturalist.

Mailed June 5th, 1918.

